**DIRECTORATE OF TECHNICAL EDUCATION**

**DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING**

**III YEAR**

**M SCHEME**

**V SEMESTER**

**2015-2016 onwards**

# ADVANCED COMMUNICATION SYSTEMS

**CURRICULAM DEVELOPMENT CENTRE**

**M-SCHEME**

**(Implemented from the Academic year 2015 - 2016 onwards)**

**Course Name : Electronics and Communication Engineering**

**Subject code : 34051**

**Semester : V Semester**

**Subject title : ADVANCED COMMUNICATION SYSTEMS**

## TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

| Subject | Instruction | | Examination | | | |
|---|---|---|---|---|---|---|
| | | | Marks | | | Duration |
| | Hrs./ Week | Hrs./ Semester | Internal Assessment | Board Examination | Total | |
| Advanced Communication Systems | 6 | 90 | 25 | 75 | 100 | 3 Hrs |

## TOPICS AND ALLOCATION:

| Unit | Topic | Time (Hrs) |
|---|---|---|
| I | Radar, navigational aids, telephony and fax, facsimile communication system | 16 |
| II | Digital Communication and Digital codes | 15 |
| III | Optical Communication | 16 |
| IV | Satellite Communication and Microwave Communication | 17 |
| V | Mobile Communication and Satellite multiple access techniques | 16 |
| | Revision, Test | 10 |
| | **TOTAL** | 90 |

## RATIONALE

The introduction of this subject will enable the students to learn about the advancement in communication systems. It will give exposure to the various modes of communication viz Radar, Telephone, Fax, digital communication, digital codes, fiber optical communication, satellite communication, microwave communication, mobile communication and Satellite multiple access techniques.

## OBJECTIVES

- To understand principles of Radar.
- To understand principles of navigation aids.
- To study electronics exchange and principles of facsimile communication.
- To study basic digital communication system and digital codes.
- To learn error detection and correction codes.
- To learn various digital modulation techniques.
- To understand optical communication system and discuss about fiber nodes, configurations and losses.
- To learn optical sources, optical detectors.
- To discuss the application of fiber optic communication.
- To study satellite system, orbits, antennas
- To study about satellite services.
- To understand fundamentals of microwave communication
- To study fundamental cellular concepts such as frequency reuse, had off
- To learn multiple access techniques.
- To learn digital cellular systems – GSM.

## 34051 ADVANCED COMMUNICATION SYSTEMS

### DETAILED SYLLABUS

| Units | NAME OF THE TOPIC | HOURS |
|---|---|---|
| I | **RADAR AND NAVIGATIONAL AIDS:**<br>Basic Radar System– Applications – Radar Range Equation (Qualitative Treatment Only) – Factors Influencing Maximum Range – Basic Pulsed Radar System – Block Diagram – Display Methods- A - Scope, PPI Display - Instrument Landing System – Ground Controlled Approach System.<br>**TELEPHONY AND FAX:**<br>Telephone System–Public Switched Telephone Network (PSTN) - Electronic Switching System – Block Diagram – ISDN – Architecture, Features - Video Phone – Block Diagram.<br>**FACSIMILE COMMUNICATION SYSTEM:**<br>Facsimile Sender-Cylindrical Scanning – Facsimile Receiver-Synchronization – Phasing - Index Of Cooperation (IOC) - Direct Recording. | 16 |
| II | **DIGITAL COMMUNICATION:**<br>Basic Elements Of Digital Communication System - Block Diagram-Characteristics Of Data Transmission Circuits - Bandwidth Requirement – Speed - Baud Rate - Noise - Crosstalk – Distortion.<br>**DIGITAL CODES:**<br>ASCII Code – EBCDIC Code - Error Detection Codes – Parity Check Codes – Redundant Codes - Error Correction Codes – Retransmission- Forward Error Correcting Code – Hamming Code - Digital Modulation Techniques – ASK, FSK, PSK, QPSK Modulation/Demodulation Techniques (Only Block Diagram And Operation). | 15 |
| III | **OPTICAL COMMUNICATION:**<br>Optical Communication System – Block Diagram – Advantages Of Optical Fiber Communication Systems – Principles Of Light Transmission In A Fiber Using Ray Theory – Single Mode Fibers, Multimode Fibers – Step Index Fibers, Graded Index Fibers (Basic Concepts Only) – Attenuation In Optical Fibers – Absorption Losses, Scattering Losses, Bending Losses, Core And Cladding Losses Optical Sources – LED - Semiconductor LASER – Principles – Optical Detectors – PIN And APD Diodes - Connectors - Splices – Couplers – Optical Transmitter – Block Diagram – Optical Receiver – Block Diagram - Application Of Optical Fibers – Networking, Industry And Military Applications. | 16 |

| | | |
|---|---|---|
| | | |
| **IV** | **SATELLITE COMMUNICATION:**<br>**Satellite system:** Kepler's I,II,II laws – orbits – launching orbits – types - Geostationary synchronous satellites - Advantages – Apogee – Perigee - Active and passive satellite - Earth eclipse of satellite.<br>**Antenna:** Parabolic reflector antenna – cassegrain antenna.<br>Space segment: Power supply- Attitude control- station keeping – Transponders – TT and C subsystem – Antenna subsystem.<br>**Earth segment:** Block diagram of Transmit receive earth station - Satellite mobile services - Basics of GPS.<br>**MICROWAVE COMMUNICATION:**<br>Microwave frequency ranges - microwave devices – Parametric amplifiers –Travelling wave tubes – simple block diagram of microwave transmitter, receiver and microwave link repeater | **17** |
| **V** | **MOBILE COMMUNICATION:** (Qualitative Treatment only)<br>Cellular telephone– fundamental concepts – Simplified Cellular telephone system - frequency reuse – Interference – Co-channel Interference – Adjacent Channel Interference – Improving coverage and capacity in cellular systems - cell splitting – sectoring – Roaming and Handoff – Basics of blue tooth technology.<br>**SATELLITE MULTIPLE ACCESS TECHNIQUES:**<br>TDMA, FDMA, CDMA. Digital cellular system – Global system for mobile communications (GSM) –GSM services - GSM System Architecture – Basics of GPRS. | **16** |
| Revision & Test | | **10** |

**Reference Books:**


- Electronic communication systems - Kennedy - Davis -Fourth Edition - Tata McGraw Hill - 1999.
- Electronics communication - Dennis Roddy and John coolen - Third Edition - PHI - 1988
- Optical fiber communication - Gerd Keiser - Third Edition - McGraw Hill - 2000
- Satellite communication - Dr. D.C. Agarwal - Third Edition - Khanna publishers - 1995
- 5 Electronic Communications systems - Fundamentals through Advanced - Wayne Tomasi – Fifth
- Edition - Pearson Education – 2005